Coffee Break Training - Fire Protection Series

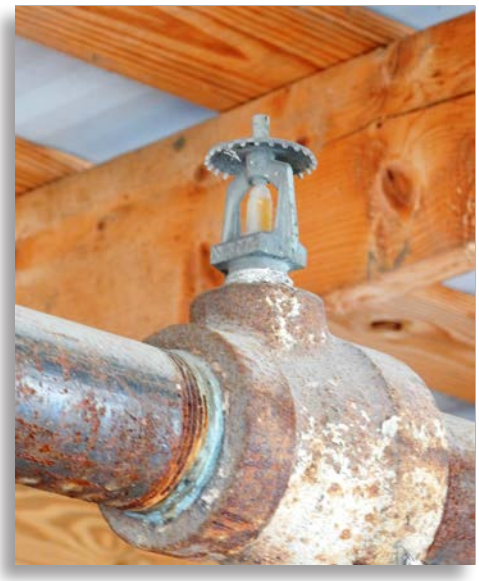
Automatic Sprinklers: Sprinkler Deflector Alignment

No. FP-2015-28 July 14, 2015

Learning Objective: *The student will be able to explain how the deflectors and frames of individual automatic sprinklers should be aligned where they are installed.*

Control mode sprinklers intended for property protection are designed to distribute water with a specific spray pattern established in Underwriters Laboratories 199, *Standard for Automatic Sprinklers for Fire-Protection Service*. Generally, the spray pattern is described as an "umbrella" shape to discharge water on burning and nearby combustibles.

In order for the spray pattern to be effective, National Fire Protection Association (NFPA) 13, *Standard for the Installation of Sprinkler Systems* provides specific guidance on how to install sprinklers. The design guidance is intended to minimize the likelihood that the spray pattern is interrupted by obstructions.



This standard spray upright sprinkler should be installed with its frame parallel to the sprinkler pipe.

Unless otherwise listed by the independent testing laboratories, upright sprinklers (such as the one in today's illustration) must be installed with the frame arms parallel to the branch line. In the photograph, note that the sprinkler frame arms are installed incorrectly **perpendicular** to the pipe. If this sprinkler were to operate, not only would the branch line beneath the sprinkler disrupt the spray pattern, but also the frame arms would create more water blockage. Aligning the frame arms with the branch line minimizes the number of obstructions in the water spray pattern. The installation rule for frame arms applies only to upright sprinklers, not pendent or sidewall.

Another consideration for sprinkler installation is how the deflector is supposed to be positioned relative to the ceiling above it. According to NFPA 13, sprinkler deflectors are to be aligned parallel to ceilings, roofs or the incline of stairs. There are two adjustments to this rule:

- Where sprinklers are installed in the peak below a sloped ceiling or roof surface, the sprinkler should be installed with deflectors positioned horizontally.
- Roofs that have a pitch not exceeding 2 in 12 (16.7 percent) are considered horizontal, and sprinklers are permitted to be installed with deflectors positioned horizontally.

Finally, the small tubular shape above the deflector in the pictured sprinkler is called a "pintle." While no longer used because of the adoption of the Sprinkler Identification Number system (Coffee Break Training 2006-29), the pintle was employed to identify sprinklers that were not a "standard" size: historically a 1/2-inch (12.7-millimeter (mm)) discharge orifice. Smaller sprinklers with a 3/8-inch (9.5-mm) orifice or larger 13/16-inch (20.6 mm) sprinklers were identified this way so the installer and inspector could recognize them easily.

For more information, consider enrolling in the National Fire Academy (NFA) course "Water-based Fire Protection System Plans Review" (R/N0137). Information and applications can be obtained at http://apps.usfa.fema.gov/nfacourses/catalog/details/10562. The course is available at the NFA in Emmitsburg, Maryland, or through your state fire service training agency.